A RAPTOR STUDY FOR THE PROPOSED GRANDY BROOK STATION TO HOPE BROOK MINE TRANSMISSION LINE ENVIRONMENTAL IMPACT STATEMENT

Prepared for:

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EXECUTIVE SUMMARY

The proposed Grandy Brook Station to Hope Brook mine transmission line study area occupies a remote area of south-central Newfoundland. Raptors have been identified as a valued ecosystem component which may be adversely affected by the proposed transmission line. Little information on population numbers and activities in the study area is available (J. Brazil pers. comm.). A raptor survey was conducted to determine raptor use of the proposed transmission line route to minimize adverse impacts the development may have on these birds.

The methodology chosen for the proposed transmission line raptor study was as follows:

- Field data were the primary information source.
- Government personnel were consulted for additional information and data files were accessed.
- Data from recent raptor surveys conducted by Fudge, Lane & Associates in the Hope Brook Mine area were an information source.
- Raptors were recorded by species and age class, and apparent activity.
- Taped recordings of raptor calls were used to try and evoke responses from raptors in the study area.

All elements of this methodology proved useful in the completion of the survey.

Data Collected

Literature review efforts revealed that specific information on raptors in the study area was totally lacking. More valuable information was gained through recent raptor surveys in the Hope Brook Mine area and conversations with J. Brazil (Newfoundland Wildlife Division).

Field Results

One field trip was conducted for the raptor survey. The fieldwork was conducted on July 12 and comprised a helicopter survey and a ground survey.

Helicopter and ground surveys were conducted along the proposed transmission line route from Grandy Brook Station to Hope Brook Mine. A total of 5 raptors representing 3 species were recorded. The raptors recorded were 1 bald eagle (Haliaeetus leucocephalus), 3 rough-legged hawks (Buteo lagopus) and 1 merlin (Falco columbarius).

Assessment of Raptor Habitat

The study area, this year, seemed to only provide hunting area for the raptor species recorded. No nests were found. All raptors were observed flying through the study area. The study area is considered to offer no unique or special habitat features that might attract raptors for nesting.

Assessment of Potential Impacts

The construction and operation phases of a hydroelectric transmission line could create a variety of potential impacts on the raptor populations in the area. These impacts were identified as; electrocution (post-construction), disturbances during construction and maintenance activities, harassment and persecution from illegal hunting, collisions with conductors, electric field and corona effects.

The most serious of the impacts are disturbances during construction and maintenance activities. Although no access roads are proposed, the potential disturbances include right-of-way clearing, resulting in a loss of habitat and removal of osprey nests (common transmission pole nesting raptor). Other major impacts are the potential increase in accessibility

to the study area by hunters. Raptors are large and may nest and/or hunt from transmission towers, a positive impact for raptors, however they are often the target for illegal shooting by hunters.

No access roads are proposed.

Mitigation

Mitigative measures are offered for all identified potential impacts of the transmission line development on raptor populations in the study area.

Reductions in disturbances can be made by performing much of the construction and maintenance duties outside the breeding season (April-July) for raptors.

Selective mechanical removal of vegetation for right-of-way construction will minimize habitat loss rather than using defoliants and/or herbicides. Limiting the construction of access roads to only those necessary or by using helicopters to move equipment will provide less access to hunters and people pursuing other recreational activities.

Although restricting access to right-of-way areas is cited as an effective means to reduce harassment of raptors by hunters, it may not be practical in the study area due to the open, barren nature of the landscape.

Conclusion

Providing much of the construction and maintenance activities of the proposed transmission line are performed outside the breeding season of raptors, the potential adverse effects of the transmission line on raptors will be minimal.

Use of transmission towers by raptors (i.e. osprey) for nesting may be a nuisance. Monitoring surveys and mitigation is suggested to address this potential problem.

1.0 INTRODUCTION

The proposed transmission line (TL) from the Grandy Brook Station to Hope Brook Mine occupies a remote area near the south coast of Newfoundland. The south coast provides nesting areas for bald eagles and ospreys (Pandion haliaetus) (Fudge, Lane & Associates 1986a, J. Brazil pers. comm.).

The area is also used by overwintering bald eagles (J. Brazil pers. comm.). Raptor species other than bald eagles and ospreys may use the area for nesting and overwintering (J. Brazil pers. comm.). The development of the TL may affect local raptor populations.

Little existing information was available on population numbers and activities of raptors in the TL study area (Fudge, Lane & Associates 1986a).

1.1 Rationale/Objectives

Raptors have been identified as a valued ecosystem component which may be adversely affected by the proposed TL (Newfoundland and Labrador Hydro 1986).

A description of raptor occurrence and activities in the proposed TL study area is required for project planning purposes to minimize any adverse impacts the project might have on these birds.

1.2 Study Area

The study area is shown in Figure 1.1. It comprises a strip of land 1 km wide (500 m on each side of the proposed TL) over the highland areas, widening to 2 km (1 km on each side of the proposed TL) through the river valleys between the Grandy Brook Station to the Hope Brook Mine Site.

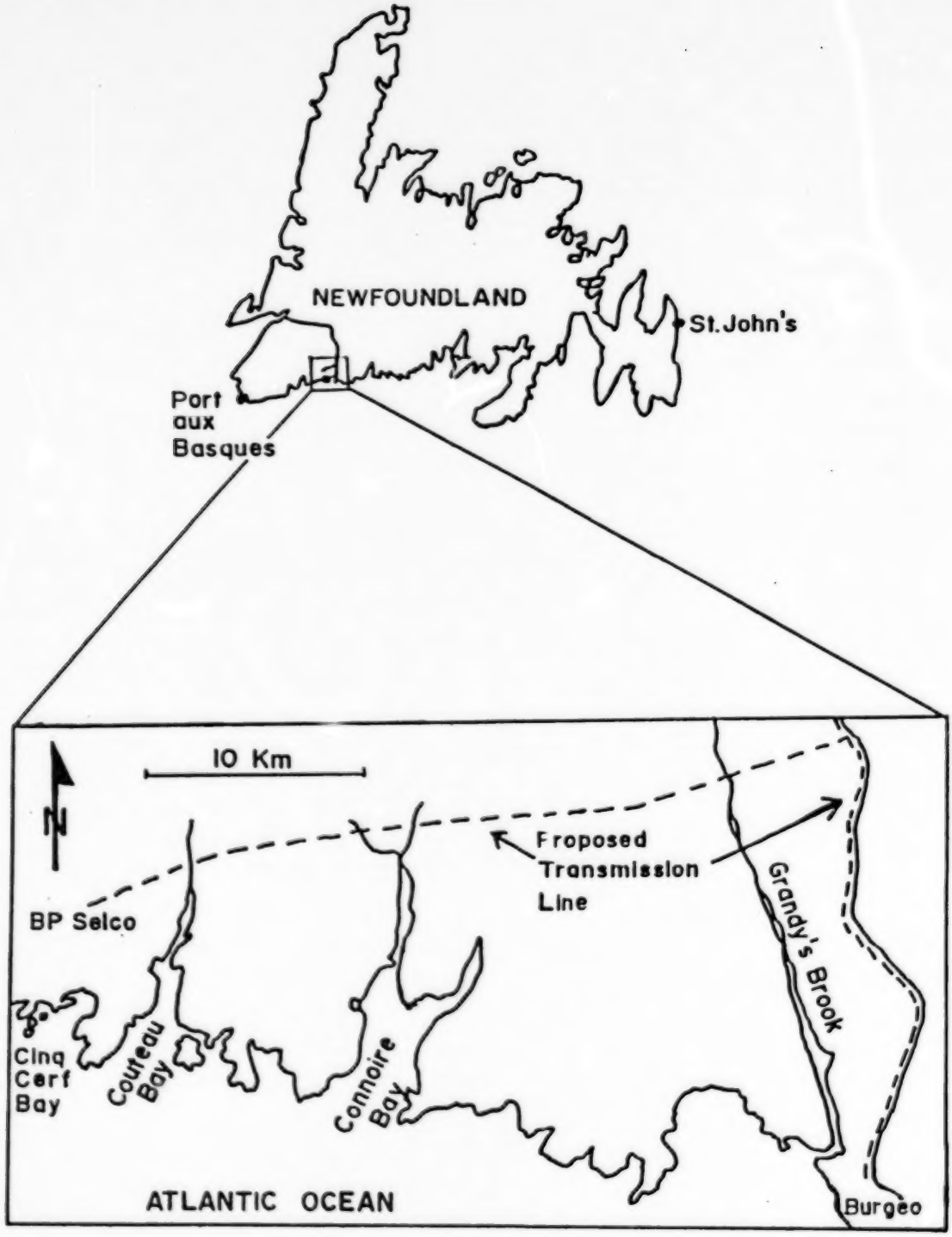

Figure 1.1 Location of study area

A regional habitat land classification of the southwest coast of Newfoundland is described in Fudge, Lane and Associates (1986c). The study area for this survey is within the area classified above and briefly described here. In addition, a detailed ecological land classification of the BP Selco Mine Study Area was completed (Fudge, Lane and Associates 1986b).

The study area can be described as part of the Maritime Barrens Ecoregion as described by Damman (1983). It includes most of the Avalon and Burin Peninsulas, the central barrens of Newfoundland and extends west along the coast to Port aux Basques (approximately 20% of insular Newfoundland).

This Ecoregion is characterized by extensive barren areas consisting mainly of dwarf shrub heath, shallow fens and bogs. Forests are most common in valleys, but they can be found occasionally on hill tops and slopes. A peculiar feature of the Ecoregion is the mingling of southern (Coastal Plain) species and arctic flora; the former occur mainly in bogs and valleys whereas the latter are restricted to exposed sites lacking snow cover during most of the winter.

Fires have occurred regularly in this region and appear to have played a major role in the development of this landscape. The area once had a forest cover with the exception of some of the higher ridges and coastal headlands. Most of the forest cover was gradually eliminated by the combined effect of frequent fires after the area became settled by European fishermen, poor regeneration after these fires, the marginal climatic conditions for tree growth, and the strong competition from ericaceous dwarf shrubs. The remaining patches of forest are generally of poor quality; height growth is particularly poor. The best forest stands occur in the deeper, sheltered valleys. It is difficult to assess the quality of the original forests since the development of the extensive barrens has undoubtedly influenced the climate of the area, particularly wind velocity

and the severity of winter snow drifting. Presumably, the original forest had a poorer overall quality than the forest stands which are present today because the forest was first eliminated from the poorest sites.

The destruction of the forest and its replacement by a dwarf shrub heath with a thick raw humus horizon has lead to increased organic matter concentrations in the B horizon of soils on topographically well-drained positions.

The study area lies within the southern portion of the Long Range Mountains Physiographic Region as described by Roberts (1983). This region is characterized by complex topography with elevations up to 750 m above mean sea level (asml). Inland from the coast much of the area is of gentle relief with occasional high summits. Glacial erratics and frost shattered rocks are scattered over the surface and there are numerous lakes and shallow peat deposits. Coarse textured till and colluvium deposits occur and are often found on steep slopes. The regional relief reflects the bedrock topography of the preglacial erosional surface over which relatively sparce glacial till has been superimposed.

1.2.1 Habitat Types of Transmission Line Study Area

As noted above, a regional habitat classification of the southwest coast of Newfoundland was described and mapped by Fudge, Lane and Associates (1986c). This habitat classification was mapped at a scale of 1:250,000 from a colour enhanced EOSAT image (from May 7, 1983).

Methodology is detailed in Fudge Lane and Associates (1986c).

The proposed transmission line will traverse four habitat types mapped on the regional habitat classification (Figure 1.2). The following is a description of the map units traversed by the proposed transmission line and includes an evaluation of each as potential raptor habitat. Nest site descriptions of raptors are given in Section 1.3.

Hb - Heath/bedrock - dominated by ericaceous heath or coniferous tuckamoor. Bedrock is commonly exposed in this habitat type. Some bedrock areas are large enough to be mapped separately. Wetlands are common but cannot be effectively mapped. Moraines are common terrain features and appear as lenticular areas of bright pink aligned roughly north-south on the EOSAT image.

Health/bedrock habitat types are common within the study area. They tend to be dryer than the areas categorised as "Wetland" but do contain wetland units as small bogs and fens. Extensive areas of lichen (Cladonia spp.) development are present but not mappable at 1:250,000 scale.

This regional habitat type could provide potential nesting habitat for the sharp shinned hawk (Accipiter striatus), rough-legged hawk, northern harrier (Circus cyanus), merlin, American kestrel (Falco sparverius), great horned owl (Bubo virginianus), hawk owl (Surnia ulula), short eared owl (Asio flammeus) and boreal owl (Aegolius funereus) (Godfrey 1966).

The heath/bedrock type comprises approximately 40% of the transmission line study area (see Figure 1.2).

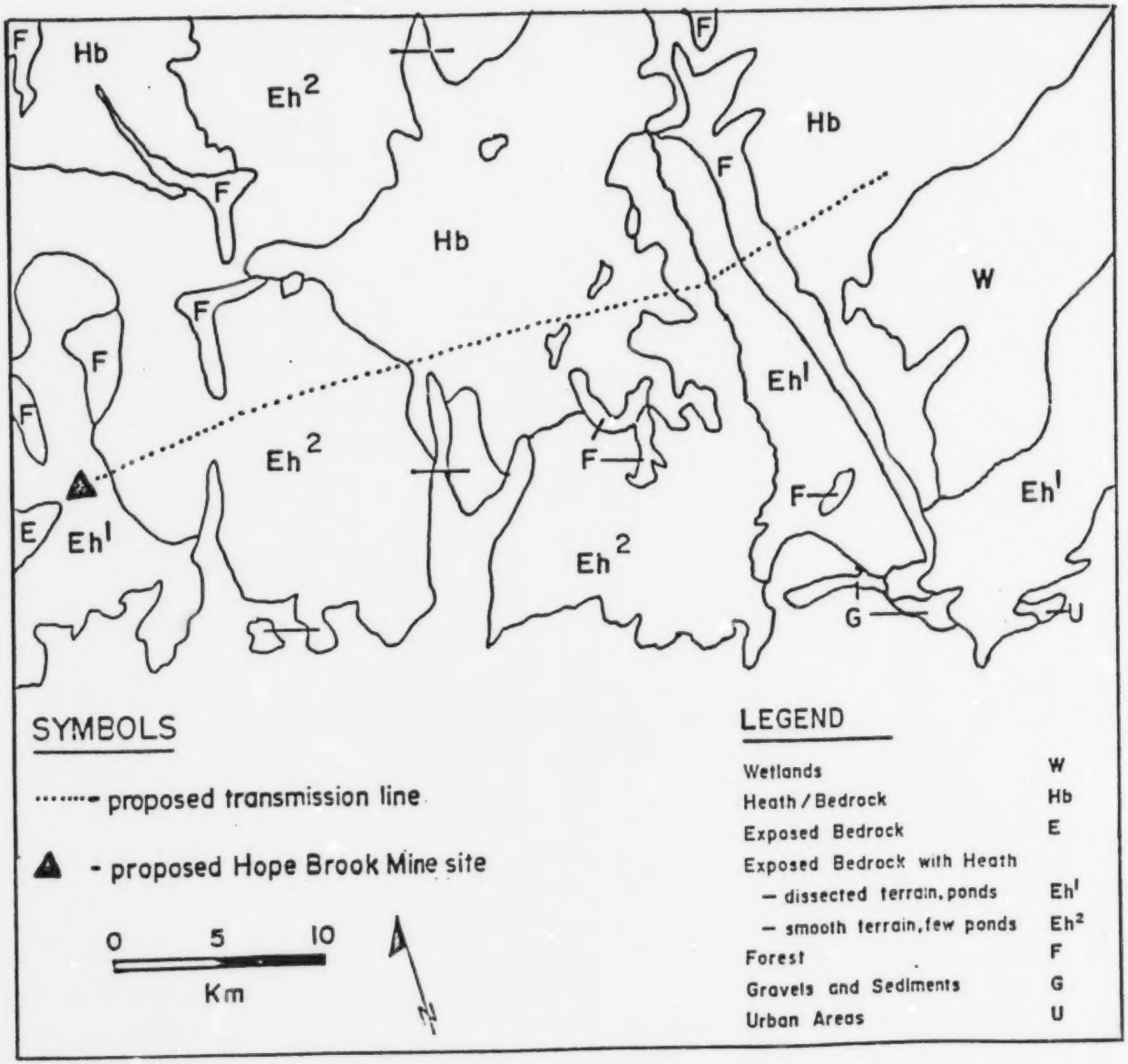

Figure 1.2. Regional habitat classification of transmission line study area.

Eh (Eh^1 and Eh^2) - Exposed bedrock with heath - large uniform areas of exposed bedrock (approx. 30% total cover) with heath shrubs and coniferous tuckamoor dominant in hollows and valleys. Some wetlands are present. In the coastal areas characterised by this habitat type, highly fractured bedrock has resulted in the formation of many angular ponds. These areas are coded "Eh^1". Inland areas have smoother bedrock and far fewer ponds, and are coded "Eh^2".

The vegetative characteristics of Eh^1 and Eh^2 are virtually the same. However, the great number of ponds and the highly dissected terrain which dominate Eh^1 mean that the habitat provided for raptors in these subunits may differ. They have therefore been separated on the basis of bedrock characteristics. The Eh^1 and Eh^2 units are quite similar to the Hb habitat type, but contain proportionally more exposed bedrock and less heath.

This regional habitat type could provide potential nesting habitat for the sharp-shinned hawk, rough-legged hawk, northern harrier, merlin, American kestrel, short eared owl, hawk owl, bald eagle and osprey (Godfrey 1966).

These two habitat types comprises approximately 50% of the transmission line study area (see Figure 1.2).

F - Forest - wooded area with trees $\geq$ 8 m in height, generally in sheltered locations such as valleys. Tree species include balsam fir (Abies balsamea), black spruce (Picea mariana), white spruce (Picea glauca), yellow birch (Betula lutea), and white birch (Betula papyrifera). Showy mountain ash (Sorbus decorum) and

mountain maple (Acer spicatum), are sometimes present but less common. Mountain holly (Nemopanthus mucronata) is also present. Understory herbs are well developed and typical of the Newfoundland Boreal Forest. Corn lily (Clintonia borealis), bunchberry (Cornus canadensis), and large leaf-goldenrod (Solidago macrophylla) dominate. The moss layer is typified by Hylocomium splendens and Pleurozium schreberi, with Sphagnum spp. in wetter areas.

An extensive history of man-made fires has reduced the forest cover in the study area dramatically since European colonization. Forests, once burned off, are replaced by an aggressive heath shrub community which precludes forest development (Meades 1983). Some relic trees and small stands which survived repeated burnings over several centuries are the only vegetative evidence of this forest in the uplands. The presence of well-developed Podzols in open heath lands indicates that forests were once far more extensive. Forest habitat is confined to valleys and sheltered hill slopes throughout the Study Area. Although it is occasionally well developed with large (+15 m) trees in the valleys, it is usually stunted and densely growing in the upland areas.

The wooded valleys in the Couteau and Grandy Brook Valleys offer potential nesting habitat for a variety of raptors.

The sharp-shinned hawk, goshawk, bald eagle, osprey, merlin, American kestrel, great horned owl, hawk owl, and boreal owl could find suitable nesting habitat in this regional habitat type (Godfrey 1966).

1.3 Methodology

Aerial Raptor Surveys. An aerial survey of the study area was conducted on July 12, 1986. The survey was conducted using a Hughes 500 helicopter flying at an altitude of approximately 60-80 m travelling 90 km/h. All raptors observed were identified to species and approximate age (adult or immature) was determined when possible. Their exact location was recorded on a 1:50,000 topographic map. Any raptor nests observed were to be recorded and mapped and the status (i.e. active/inactive, with eggs, young, adults, attending) was to be determined. There were two observers in addition to the pilot during the flight. The observer sitting beside the pilot and the pilot were the principal observers. The other observer concentrated on accurately recording flight route and sightings in addition to observing.

The study area was investigated prior to the field survey using aerial photographs and 1:50,000 topographic maps. Areas suspected to be likely nesting sites for raptors were identified by the study team prior to going in the field then searched thoroughly from the air for signs of nesting activies (nesting material, bird droppings).

The criteria used to determine likely nesting areas for raptors were obtained from Godfrey (1966). Brief descriptions from Godfrey (1966) are provided.

Goshawk (Accipiter gentilis): Nest, a bulky structure of sticks with bark lining and often a few fresh twigs of evergreen, is placed 6 to 20 m up in a tree, either deciduous or coniferous, the former preferred. The wooded valleys in the study area would provide likely nesting areas for goshawks.

Sharp-Shinned Hawk (Accipiter striatus): Nest is placed in a tree, preferably coniferous, 3 to 20 m up. It is rather large (crow size), is made of small sticks and lined with twigs and bark. The wooded valleys in the study area would provide likely nesting areas for sharp-shinned hawks.

Rough-Legged Hawk (Buteo lagopus): Nest is made of sticks, grasses, and weed stalks (depending on availability of material) and is placed on cliff ledges, boulders, shelves in steep river-banks, and, when available, in trees at heights of 6 to 10 m; occasionally on flat ground. The exposed bedrock and morainal veneer sites in the study area would provide likely nesting areas for rough-legged hawks.

Bald Eagle (Haliaeetus leucocephalus): Nesting mostly in trees, frequently near the top; more rarely on cliff ledges. Nest, a large structure of sticks and weeds with a wide variety of trash as lining material. As nests are used for many years, they may become huge. The woody river valleys and exposed bedrock sites of the study area provide likely nesting areas for bald eagles.

Northern Harrier (Circus cyanus): Nest, composed of weeds, sticks, grasses and rushes, is placed on the ground among low bushes or other low vegetation, usually in a moist meadow or marshy place but sometimes, especially on the prairies, in dry places.

Although the distribution of harriers in insular Newfoundland is not known (Godfrey 1966) the habitat along the south coast appears to be suitable. The morainal veneer and bog/ fen complex areas would provide suitable nesting areas for harriers however, it is unknown whether the small mammal prey base could support breeding harriers.

Osprey (Pandion haliaetus): Nest, a massive structure of sticks, is placed at various heights usually in isolated trees, either dead or living; sometimes on telephone poles, cliff pinnacles or on the ground. The wooded river valleys and exposed bedrock sites in the study area are likely nesting sites for ospreys.

Merlin (Falco columbarius): Nest is frequently an abandoned one of some other species, such as the crow (Corvus brachyrhynchos) or magpie (Pica pica), in either a coniferous or deciduous tree; occasionally in a tree cavity or on a cliff ledge; sometimes a hollow in the ground. The wooded areas, river valleys and exposed bedrock sites in the study area are likely nesting places for the merlin.

American Kestrel (Falco sparverius): Nests (little or no attempt at nest building) in a natural cavity or woodpecker hole in a tree; sometimes also in a cliff cavity, magpie nest, bank burrow, bird box or suitable recess in a building. The wooded areas in the study area are likely nesting places for the American kestrel.

Great Horned Owl (Bubo virginianus): Nest, usually in an old nest of a hawk, crow or squirrel in trees; sometimes in a cavity in a tree or on a cliff ledge. The wooded areas and exposed bedrock sites in the study area are likely nesting places for the great horned owl.

Hawk Owl (Surnia ulula): Nests in hollow top of a dead tree stub, in an old woodpecker hole, or in an old hawk or crow nest. The wooded portions of the study area are likely nesting places for the hawk owl.

Short-Eared Owl (Asio flammeus): Nests on ground in open places, a depression often sparsely lined with grasses and similar material, sometimes sheltered by a clump of grass or weeds. The open morainal areas and fen/bog complexes in the study area are likely nesting places for short-eared owls.

Boreal Owl (Aegolius funereus): Nests in cavities in trees (abandoned nests of larger woodpeckers or in natural cavities). The tree may be either broadleaf or conifer. The wooded valleys with large trees in the study area are likely nesting places for the boreal owl.

Ground Surveys. Walking surveys were conducted along the proposed centre line of the TL through the valleys of Grandy Brook, both branches of Northwest Arm Brook, and Couteau Brook. In addition, km 3.5-4.5, 10, 15, 25 and 27 (total of 5 km) along the proposed centre line of the proposed transmission line route beginning at the Grandy Brook station was walked. These portions of the study area were selected to represent different habitat types that may provide suitable nesting habitat for raptors.

The valleys of Grandy Brook and Couteau Brook are sloped forest and river bottom forest habitat. The branches of Northwest Arm Brook are tuckamoor, fen/bog complex and exposed bedrock habitats.

Area 3.5 km - 4.5 km is open morainal veneer habitat while areas 10km - 11 km and 15 km - 16 km were open habitats with some tuckamoor and exposed bedrock sites.

During the walking surveys a tape recording of merlin, sharp-shinned hawk, great-horned own and goshawk calls were played every 15-20 minutes. Any raptors heard calling back to the tape were identified by sound and recorded.

The raptor vocal recordings used were selected on the basis of availability. The call of the great-horned owl should evoke a response, vocal and/or defensive behaviour, from any other raptor breeding in the area. Great-horned owls are a predator of many north american raptors and are capable of taking raptors the size of a red-tailed hawk (Buteo jamaicensis) (Newton 1979). A small hand held tape recorder was used and its broadcast distance is not considered to be too large. However, the tape recording was played every 10-15 minutes during the ground survey. This exercise is not intended to be interpreted as a major methodology used in raptor inventories but only as an additional tool used since some time was spent on the gound in the study area.

The ground survey was initiated at approximately 11:00 hours and terminated at approximately 15:00 hours.

Other Wildlife. All avifaunal and mammal species observed during the surveys were recorded.

1.4 Study Team

David B. Lemon, B.Sc.
Biologist

Mr. David Lemon is a wildlife biologist who has a strong background in raptor studies. He has participated in a large number of raptor field studies in Ontario and Quebec. He is familiar with the field identification and life history of all raptor species within the study area. He has recently completed a detailed account of the raptor species present and their activities in the Hope Brook mine area.

Pierre Ryan, B.Sc.
Biologist

Mr. Pierre Ryan is a wildlife biologist with an impressive background in avifaunal studies. He has participated in bird banding and survey projects for the Canadian Wildlife Service in Newfoundland and Labrador for the past 6 years. He has a strong background in raptor identification and has recently completed a helicopter and ground survey for raptors in Labrador.

1.5 Acknowledgments

Fudge, Lane and Associates Limited would like to acknowledge the assistance of Viking Helicopters Limited, especially pilot Scottie Aldie.

2.0 RESULTS, DISCUSSIONS AND CONCLUSIONS

2.1 Results

The results of the raptor surveys are presented in Table 2.1. All raptors were observed from the air. No raptor nests were observed. The aerial and walking survey paths and the locations of the observations of raptors are shown in Figure 2.1. Approximately 8 km was covered during the walking surveys in the valleys.

A list of all avifauna observed during the surveys are presented in Appendix 1. No mammals were observed in the study area.

No vocal responses or defensive behaviour were evoked from raptors by using the tape recorder.

GRANDY BROOK STATION TO HOPE BROOK MINE SITE

PROPOSED TL

Raptor Species	Bottom Brook Substation To Burgeo Proposed TL	Couteau Brook Valley	Northwest Arm Brook Valley	Grandy Brook Valley	km 3.5-4.5	km 10-11	km 15-16	km 25-26	km 27-28	Total Raptors
Bald Eagle (adult)	-	-	-	1	-	-	-	-	-	1
Rough-Legged Hawk (adult)	-	-	-	2	-	1	-	-	-	3
Merlin (adult male)	-	-	-	-	-	-	1	-	-	1
Total Raptors	-	-	-	3	-	1	1	-	-	5

TABLE 2.1: Number and location of raptor species observed during helicopter and walking surveys conducted 12 July 1986. No raptors were seen during ground survey.

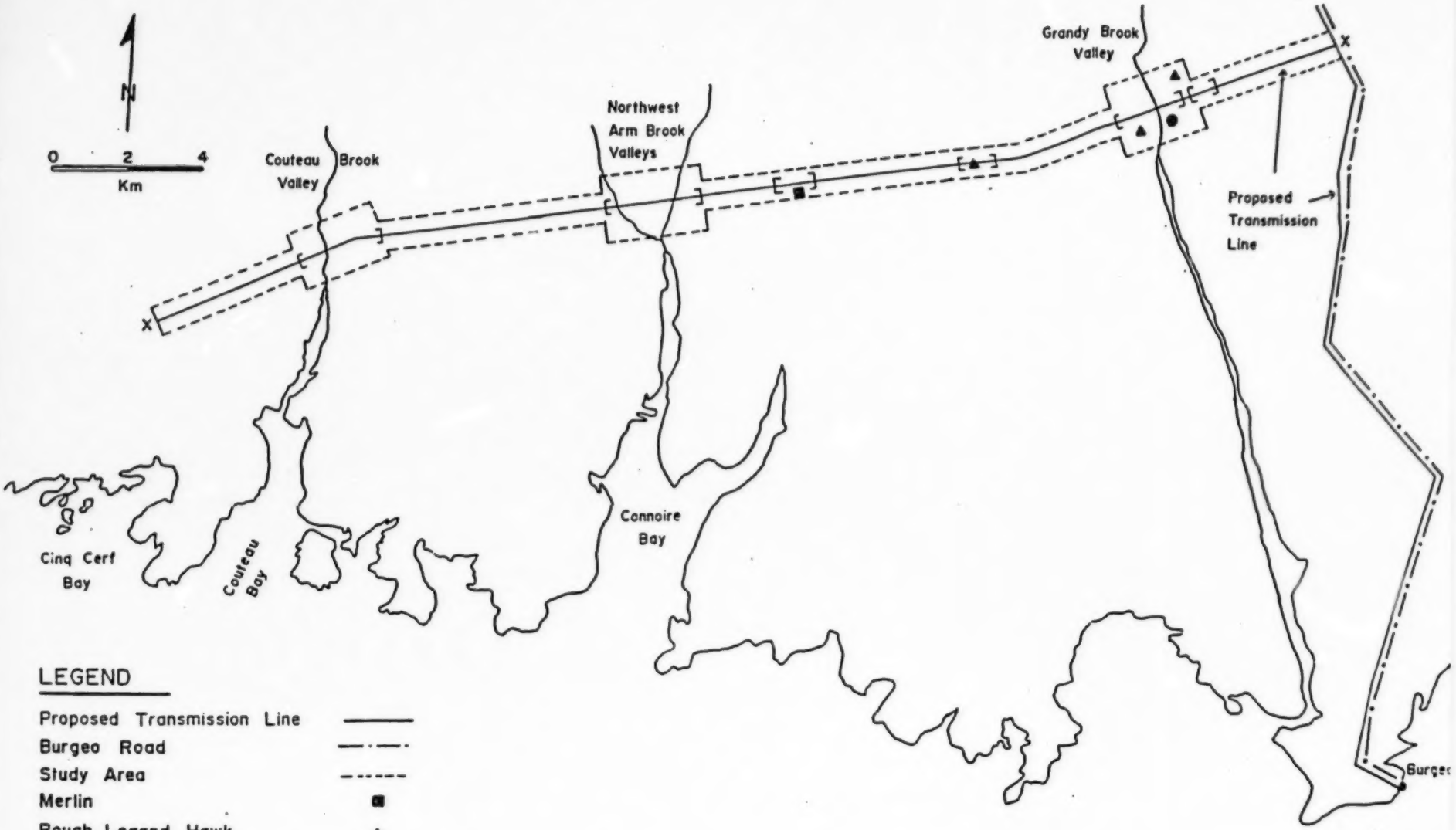

FIGURE 2.1. Location of Raptors Observed in Study Area.

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2.2 Discussion

The raptor species of major concern in the study area were bald eagles and ospreys as identified in the terms of reference, due to possibility of these large raptors nesting and/or hunting from transmission towers and conductors.

Only 1 bald eagle was observed during the survey. It was seen soaring along the Grand Brook valley at an altitude of approximately 60 m. It was considered to be hunting and was observed continuing to soar up the river valley. No nest was found in the study area.

Two rough-legged hawks were observed in the Grandy Brook valley. One rough-legged hawk was observed west of the Grandy Brook valley at km 10-11 of the TL study area.

One of the rough-legged hawks observed at Grandy Brook valley appeared to be the mate of the rough-legged hawk observed at km 10-11. No nest was found in the study area.

The adult male merlin observed at km 15-16 of the TL study area was flying through the area. No nest was found in the study area.

Playing tape recorded calls of various raptors during walking surveys can enhance any walking/bird watching survey by possibly evoking vocal or other physical responses from otherwise concealed birds. During the breeding season birds are often not vocal so as not to attract undue attention of predators to their nests. The great-horned owl is capable of preying on any raptor nestlings, with the possible exception of bald eagle and osprey nestlings, that may nest in Newfoundland.

The study team co-ordinator for Fudge, Lane and Associates Limited has had success locating goshawk, red-tailed hawk, red-shouldered hawk (Buteo lineatus) and screech owl (Otus asio) by playing tape recordings of great-horned owl calls during the breeding season of these raptors.

The study area occupies a narrow strip of land that is representative of the Maritime Barrens Ecoregion. Although no nesting raptors were observed during this survey the habitat types found in the study area potentially offer nesting habitat for a considerable number of raptor species. The potential of any area to support raptor populations can only be considered after a thorough analysis of prey base. Information on prey base does not exist for this area and is beyond the scope of a raptor survey. Unless prey base assessment is made the true or actual potential of an area to support raptors in any given portion of its range is only conjecture.

No physical or vegetation features in the study area were observed that would make the study area exceptional, compared to other portions of the south coast uplands, for nesting raptors. No information exists on raptor density in insular Newfoundland.

This survey was conducted during the mid to latter portion of the breeding season of local raptors. A rough-legged hawk nest was located outside the study area during the aerial survey. The nest contained 4 chicks approximately 3 1/2 weeks old. On 3 June 1986 a bald eagle nest in Cinq Cerf Bay, just southwest of the study area, was observed by Fudge, Lane and Associates Limtied to have fallen from a cliff with 1 dead eaglet approximately 3-4 weeks old.

2.3 Conclusions of Field Study

Aerial and walking surveys for raptors in the TL study area yielded 5 raptors of three different species. One bald eagle, 1

merlin and 3 rough-legged hawks were observed. No raptor nests were observed in the study area during this survey. The study area offers no unique or outstanding landforms or habitat characteristics that are not found in surrounding habitat. Any raptors disturbed by the TL construction or other activities associated with the TL would have abundant areas/habitat to relocate their hunting/nesting activities.

The field survey methods employed in this survey are considered adequate for a short duration field trip to inventory raptors during the breeding season. The survey conducted as such in a relatively long, narrow study area precludes the possibility of missing any bald eagle or osprey nests.

3.0 IMPACT ASSESSMENT AND MITIGATION

3.1 Introduction

The direct potential impact of hydroelectric transmission lines on raptors are identified as electrocution (post-construction), disturbances from construction activities, maintenance activities, harassment and persecution by humans, collisions of raptors with conductors and electric field and corona effects (Olendorff et al. 1981).

3.2 Electrocution

Raptors are electrocuted by transmission lines because of two seemingly unrelated but interactive factors: 1) the distribution, size, behaviour and other biological aspects of raptors, and 2) designs of electric industry hardware which place phase and ground wires close enough together that raptors can touch both of them simultaneously with their wings and/or other parts of their bodies (Olendorff et al. 1981).

Most transmission lines that electrocute raptors carry between 12 and 69 kv (Benson 1981, from Olendorff et al. 1981). Nelson (1979 from Olendorff et al. 1981) concluded that TL carrying 69 kv do not pose much of a hazard to dry eagles because the birds, with their 2.0-2.3 m wingspan can only make wingtip contact with the wires and dry feathers are almost as good an insulator as air. Large size is by far the most crucial factor which predisposes certain raptors to electrocution.

The proper design of new transmission line facilities, structures and suggested practices to minimize the possibility of raptor electrocution primarily concern lines carrying between 4 and 69 kv (Olendorff et al. 1981).

The proposed hydroelectric transmission line from the Grandy Brook station to the Hope Brook Mine area will be 138 kv. The three phase conductors (wires) will be spaced 4.25 m apart. Since bald eagles, the largest raptor in the study area, have a wingspan of 2.0-2.3 m, electrocution of raptors is not considered a potential adverse impact of the transmission line through the study area.

3.3 Construction Activities

The adverse impacts of TL construction include: 1) loss of habitat through right-of-way clearing (where it is done), construction of access roads and actual placement of poles, towers and conductor pulling sites; and 2) disturbance of raptors through interference with courtship, nest building, incubation and foraging which leads to desertion of nearby natural nests and roosts (Olendorff et al. 1981). Generally, wildlife activity will cease in the immediate construction area, and nests that are close to the construction will often be deserted (Stahlecker 1975, from Olendorff et al. 1981).

However, all raptors seen in the study area during the survey were considered to be hunting or just soaring through the area as opposed to nesting.

The proposed transmission line will probably not adversely affect nesting or hunting raptors due to the abundance of similar habitat surrounding the study area. Any potential activities involving vegetation clearing for right-of-ways can be minimized by selective clearing of overstory and leaving the understory intact to the extent possible (Olendorff et al. 1981). Therefore selective mechanical thinning to minimize vegetation loss would be more desirable than using defoliants and/or herbicides to reduce the potential adverse impact on raptor habitat.

Impacts on vegetation can also be limited by making use of existing roads and trails and construction lines with the aid of helicopters rather than building new access roads (Oldendorff et al. 1981).

Adverse impacts of construction activities on courtship, nest building, incubation and foraging can be minimized by concentrating construction activities in the late summer, fall and winter months. Again, however, the study area is not considered a significant area for raptor nesting activity.

3.4 Maintenance Activities

The principal negative effect of power line maintenance is the destruction of nests built on transmission towers (Olendorff et al. 1981). Long sticks on transmission towers may sometimes span the distance between the tower and a conductor and cause flashovers, particularly in wet weather, if a nest is built over a suspended insulator.

Although there has never been a record of bald eagles nesting on transmission towers (Oldendorff et al. 1981) ospreys construct large nests and often use transmission towers for a nest site (Toner and Bancroft 1986).

Van Daele (1980) reported that throughout their range ospreys frequently nest on power poles. This habit is advantageous because it provides the birds with good nest sites but increases their susceptibility to human disturbance, electrocutions and power interruption caused by hanging material (Van Daele 1980). Management practices which can be used to minimize the adverse effects of power pole nests include the construction of artificial nesting platforms and/or nesting discouragement devices (Van Daele 1980). An exhaustive review of artificial nesting platforms and nesting discouraging devices are presented in Olendorff et al. (1981) and Toner and Bancroft (1986).

Toner and Bancroft (1986) have suggested several possible alternatives for addressing the problem of ospreys nesting on transmission towers. Their alternatives and rationale include:

"- Do nothing.
- Trim the nest, but don't remove it.
- Move nest to another point on the structure.
- Move the line to another point on the structure.
- Remove nest with or without invalidating the site.
- Relocate nest with or without invalidating the site.

In assessing the merits of each possible alternative one must bear in mind the priority of the site, the costs of action, the available resources, accessibility of the site, the season of the year, and the possible consequences.

The "do nothing" alternative would be appropriate if no major problem exists or if costs and availability of resources were prohibitive. However, this is not a wise option if remedial action taken later would be more costly.

"Trimming" is a good option if a series of nests pose no major problems except for a few errant branches. Such an action is inexpensive and does not drastically alter the habitat for the birds. It should be done quickly if eggs or young nestlings are present.

Moving the nest to another part of the structure is a wise choice if no other sites exist and relocation poles would be expensive. Platforms can be affixed to the top of the existing pole to remove the nest from the dangerous area of the pole. While this is strategy can be effective, the disadvantage is that the nest is still on the pole, and may prove to be a problem again in the future.

An alternative to moving the nest is moving the line on the pole. This has been done at Waterton Lakes National Park (Winkler - 1980 pers. comm.). In effect, the distance between the nest and the line is increased reducing possible problems.

The nest can be simply removed. Old inactive nests could be removed with little probability of re-building occurring. Alternately, in areas where an abundance of natural nest sites occur, the nest could be removed with an invalidation structure installed to prevent rebuilding.

> Relocation of the nest is appropriate when nest removal is essential but no natural sites are available. This reduces the problem to the utility but preserves the bird's nesting site. If rebuilding is expected, invalidation of the old site is a wise option." (Toner and Bancroft 1986).

Toner and Bancroft (1986) developed a decision flow chart which provides an objective basis for considering the above suggested alternatives to removal of the nest (Figure 3.1).

3.5 Harassment and Persecution

Increased accessibility by man to previously undisturbed areas is usually the greatest long-term impact of power line construction of wildlife (Olendorff et al. 1981). This leads directly to illegal shooting of roosting and nesting birds by indiscriminate hunters.

The frequency with which raptors are shot off power lines and their support structures is related to the distance between the lines and the nearest road (Olendorff et al. 1981). In the south coast region of the study area, where there are no public roads, increased mortality of raptors due to the proposed TL and shooting is not considered a serious problem.

3.6 Raptor Collision with Transmission Lines

Research has shown that raptors do collide with power lines (Glue 1971, Fitzner 1975). However, raptor collision is not a major problem with transmission lines (Pinkowski 1977 and Kroodsma 1978, from Olendorff 1981). This is generally attributed to the high visual acuity of raptors and the large size of transmission line conductors (Olendorff et al. 1981).

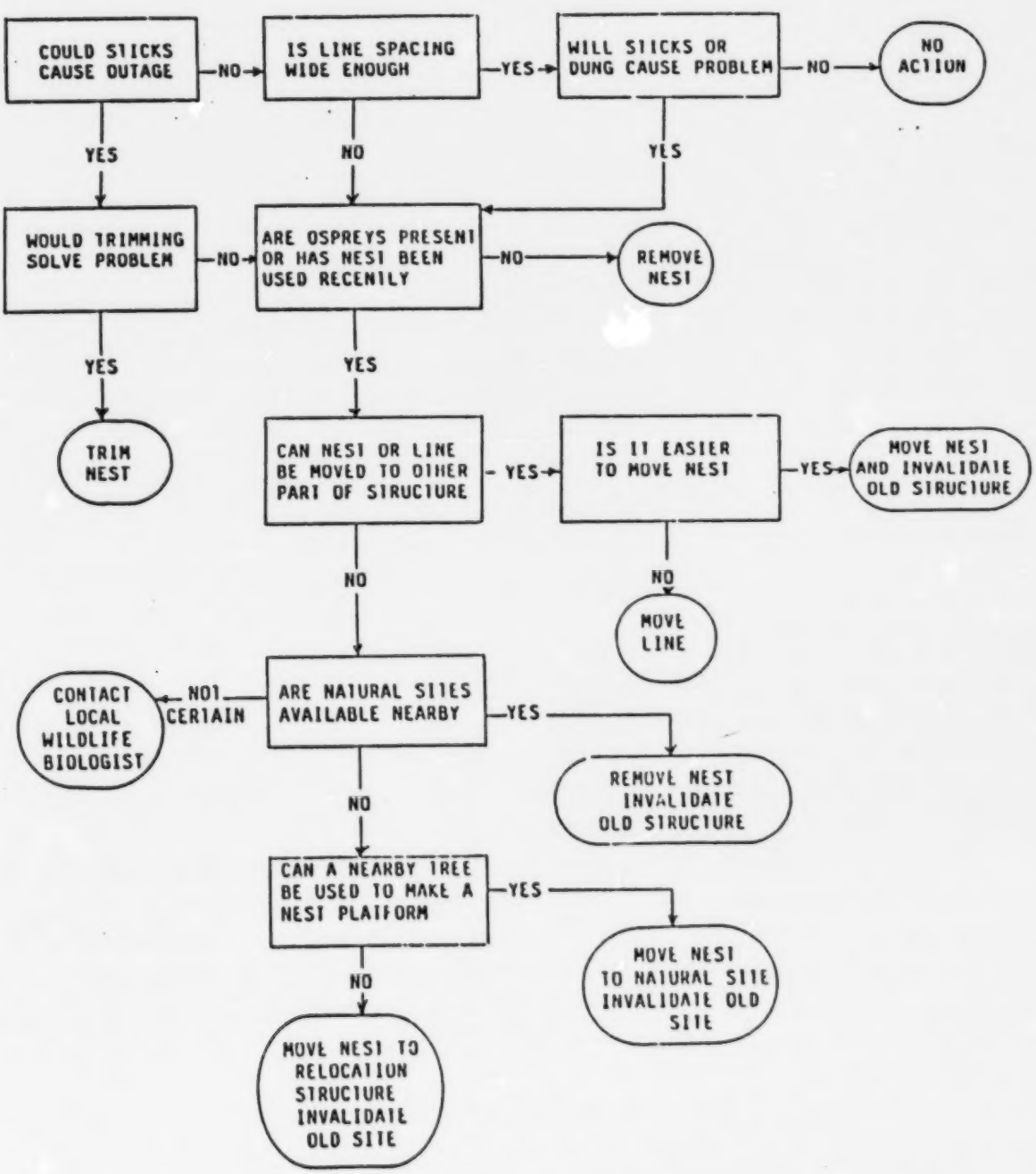

Figure 3.1: Decision chart for alternatives to osprey nest removal from transmission towers (from Toner and Bancroft 1986).

3.7 Electric Field and Corona

No significant impacts of electric and magnetic fields and corona (noise and ozone) have been identified on perching and nesting raptors (Lee 1980, from Olendorff et al. 1981).

3.8 Conclusions

There were no raptors observed nesting in the study area. However, the study area does provide suitable nesting habitat for local raptors and construction and maintenance activities during the breeding season (April-July) would pose the most serious potential adverse affects of the proposed transmission line development. If contruction and maintenance activities are scheduled outside the breeding season no adverse affects on breeding raptors are anticipated.

Transmission line towers are cited as a possible positive impact on local raptor populations by providing elevated perches for hunting. The possible use of transmission towers by ospreys as nesting sites is considered a negative impact on both ospreys (possible electrocution, relocation or termination of nesting attempt) and transmission line operation (costs of nest removal, possibility of flashovers). If the proposed transmission line is constructed, Newfoundland and Labrador Hydro should consider an annual monitoring survey (i.e. late May) to see if the transmission towers are being used as nest sites for raptors. If nests are being constructed by raptors on transmission towers the appropriate actions (see Section 3.4) should be taken.

If the proponent determines, in the future, that nesting raptors become a nuisance to transmission line operation a study should be undertaken to access possible mitigation strategies.

No further pre-construction raptor studies are recommended.

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5.0 PERSONAL COMMUNICATIONS

Brazil, J. Wildlife Biologist. Newfoundland and Labrador Wildlife Division. Raptor data.

APPENDIX 1

Common and scientific names of all wildlife observed during helicopter and walking surveys of the study area. (After Peterson, R.T. 1980. A Field Guide to the Birds East of the Rockies.)

Common loon	*Gavia immer*
Rough-legged hawk	*Buteo lagopus*
Bald eagle	*Haliaeetus leucocephalus*
Merlin	*Falco columbarius*
Greater yellowlegs	*Tringa melanoleuca*
Herring gull	*Larus argentatus*
Black-backed woodpecker	*Picoides tridactylus*
Grey jay	*Perisoreus canadensis*
Raven	*Corvus corax*
Common crow	*Corvus brachyrhynchos*
American robin	*Turdus migratorius*
Swaninson's thrush	*Catharus ustulatus*
Grey-checked thrush	*Catharus minimus*
Boreal chickadee	*Parus hundsonicus*
Ruby-crowned kinglet	*Regulus calendula*
Tennessee warbler	*Vermivora peregrina*
Yellow warbler	*Dendroica petechia*
Yellow-rumped warbler	*Dendroica coronata*
Black-throated green warbler	*Dendroica virens*
Common yellow throat	*Geothlypis trichas*
Wilson's warbler	*Wilsonia pusilla*
Blackpoll warbler	*Dendroica striata*
Savannah sparrow	*Passerculus sandwichensis*
Tree sparrow	*Spizella arborea*
White-throated sparrow	*Zonotrichia albicollis*
Swamp sparrow	*Melospiza georgiana*
Fox sparrow	*Passerella iliaca*
Song sparrow	*Melospiza melodia*

APPENDIX II

TERMS OF REFERENCE

RAPTOR COMPONENT STUDY

FOR THE GRANDY BROOK

STATION TO HOPE BROOK STATION

TRANSMISSION LINE ENVIRONMENTAL

IMPACT STATEMENT

RATIONALE:

Raptors have been identified as a valued ecosystem component which may be adversely affected by the proposed transmission line between Grandy Brook Station and the Hope Brook Mine (approximately 33 km).

OBJECTIVE:

The objective of this survey is to increase our knowledge of raptor utilization of the proposed transmission line route from the Burgeo Road to the Hope Brook Mine in order to minimize any adverse impacts the project might have on these birds.

STUDY AREA:

A one km wide corridor along the center line of the proposed right-of-way (i.e., 500 m on both sides of the center line). The study area increases to one km on both sides of the center line within the valleys of Grandy Brook, both branches of Northwest Arm Brook above Connoire Bay, and Couteau Brook.

METHODS:

The consultant shall:

1. conduct a review of the literature and government files for pertinent information;

2. liaise with expert ornithologists and Wildlife Division personnel(J. Brazil and/or K. Curnew);

3. conduct a helicopter survey of the study area prior to 15 July 1986 to document the occurrence of bald eagles (Haliaeetus leucocephalus) and ospreys (Pandion haliaetus), to locate nests, and to assess the number of young birds and/or eggs in the nests;

4. conduct a walking survey of part of the route along the proposed center line to document the occurrence of raptors other than bald eagles and ospreys; this survey shall include:

   (1) valleyr of Grandy Brook, both branches of Northwest Arm Brook, and Couteau Brook; and

   (2) km 3.5 - 4.5, 10, 15, 25 and 27 along the proposed center line (total of 5 km);

5. qualitatively assess, on a species basis, raptor habitat within the study area.

OTHER:

1. During the same period, the consultant shall conduct a helicopter survey of the proposed transmission line route between Bottom Brook substation and Burgeo (approximately 145 km) to document the occurrences of bald eagles and ospreys, to locate nests, and to assess the number of young birds and/or eggs in the nests; the study area for this survey shall be 500 m on both sides of the proposed center line;

2. The consultant shall coordinate travel arrangements with other studies and work being conducted in the area by B.P. Selco and Hydro.

3. The field work shall be completed by 15 July 1986.

REPORT:

The consultant shall provide two reports. The report on the Grandy Brook Substation to Hope Brook Mine section of the transmission line shall:

1. identify raptors which have been recorded within or near the study area and the seasonality of occurrence; seasonality will be derived from the literature and personal communications; nest locations shall be mapped;

2. qualitatively describe and assess raptor habitat within the study area;

3. list species of birds, other than raptors, and mammals observed during the surveys;

4. describe potential impacts (including increased access) of the project on raptors and possible mitigative measures; this should include any positive impacts;

5. discuss the need for further studies and/or monitoring; if further studies are recommended, they shall be discussed in detail; and

6. a draft report (one copy) shall be submitted to Hydro by 31 July 1986; following a review period, comments will be provided to the consultant; one copy of the final report shall be submitted to Hydro within 30 days of receipt of comments.

Results of the helicopter survey of the proposed transmission line route between the Bottom Brook substation and Burgeo shall be submitted to Hydro as a data report by 15 July 1986 and will not be included in the above report.